IOWA DEPARTMENT OF NATURAL RESOURCES

WATER SUMMARY UPDATE

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A snapshot of water resource trends for the 2022 Water Year

2022 Water Year Summary

OVERVIEW – WATER YEAR ENDS WITH DROUGHT CONDITIONS WORSENING

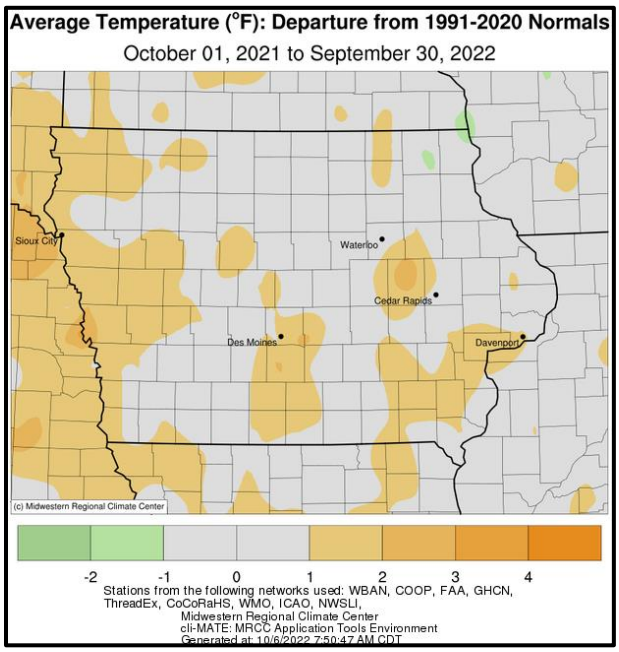
The "Water Year" is defined as the period between October 1st and September 30th. This time period is used because accumulating snow is the primary source of water runoff into streams during the next calendar year for many parts of the United States. The 2022 Water Year ended on September 30th, 2022 and the preliminary precipitation total for the 12-month period was 29.51 inches or 6.04 inches below normal. The US Drought Monitor showed improvement as Iowa moved from spring into summer, but by the end of the water year the state was back where it started the water year. The October 6 Drought Monitor shows 85 percent of the state in some form of dryness or drought, with over 25 percent of Iowa rated as either moderate or severe drought.

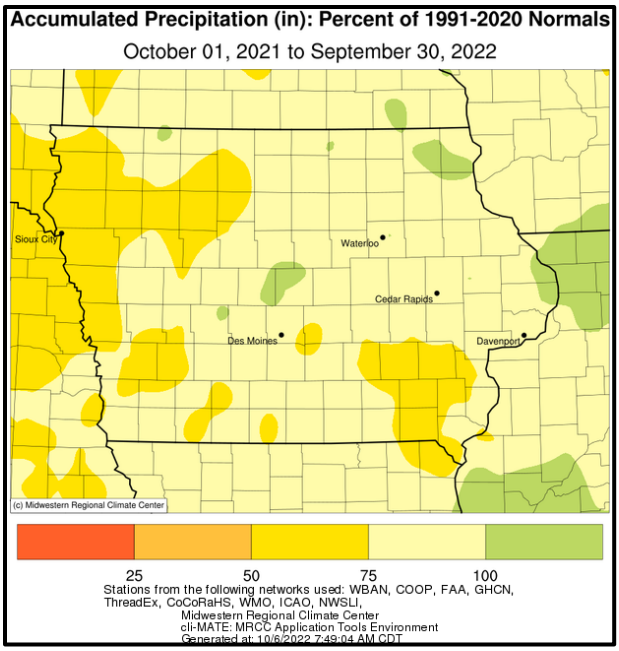
WATER YEAR PRECIPITATION AND TEMPERATURE

The 2022 Water Year ended on September 30th, 2022, and the preliminary precipitation total for the 12-month period was 29.51 inches, or 6.04 inches below normal. Preliminary temperatures averaged 49.0 degrees, which is 0.6 degree above the 1991-2020 climatological normal for Iowa. This was the 47th driest and ties 1893 and 2021 as the 47th warmest Water Year among 150 years of statewide records; 2020 was drier and 2016 was warmer.

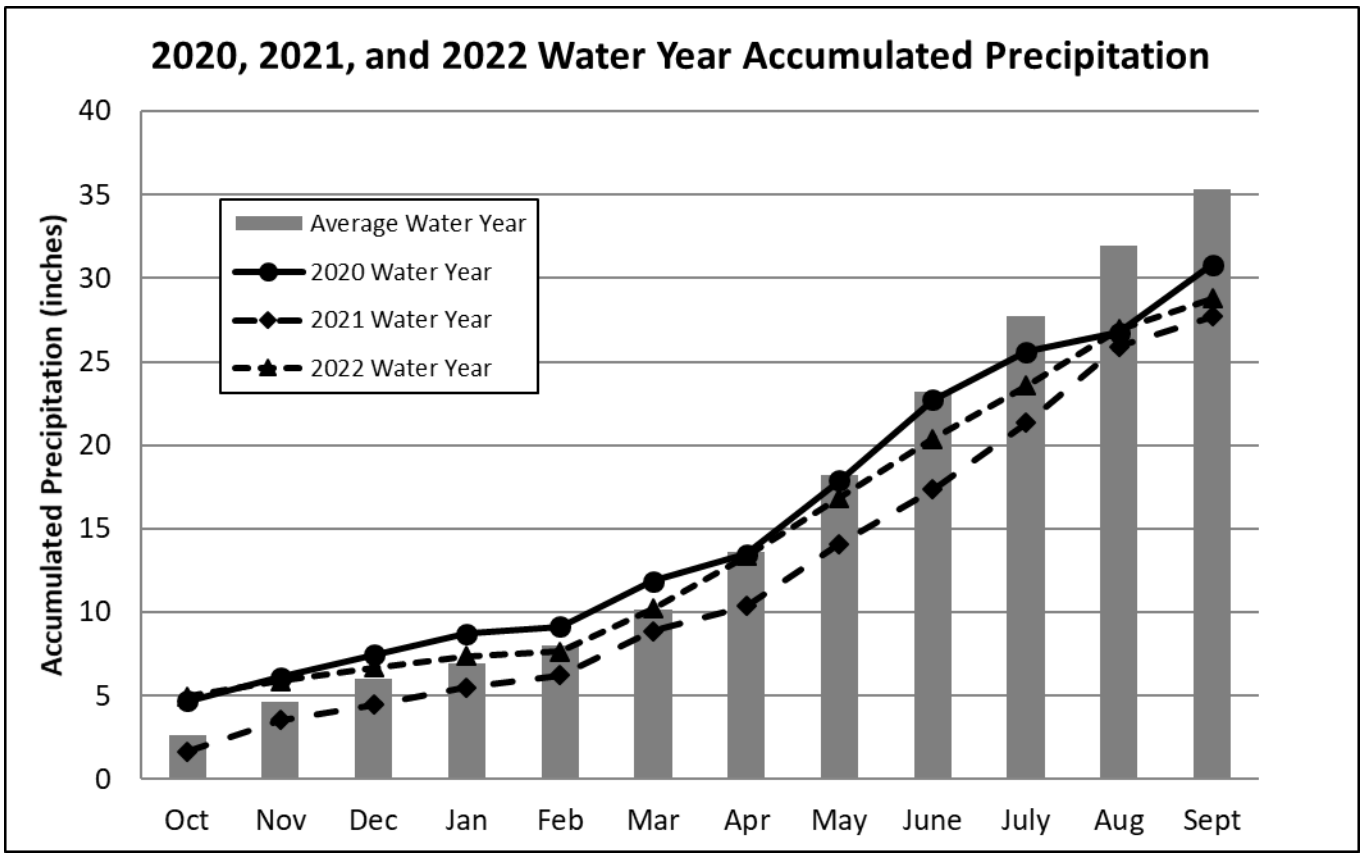
A vast majority of rain gauges reported precipitation deficits for the water year, with pockets of northwestern and southeastern Iowa measuring 12 to 15.00 inches below the 30-year normal. Much of the state observed negative departures above three to six inches. Iowa averaged 32.2 inches of snowfall, 5.0 inches below normal. Notable months during the water year include the 8th wettest October, the 13th warmest December, the 6th driest February and the 12th coldest April.

The two figures that follow show temperature and precipitation distributions for the water year across the state. The areas shown in green indicate the parts of the state that received above-normal precipitation, which are limited to a few small pockets. The very dry conditions in northwest and southeast Iowa can be seen in the darker yellow color.



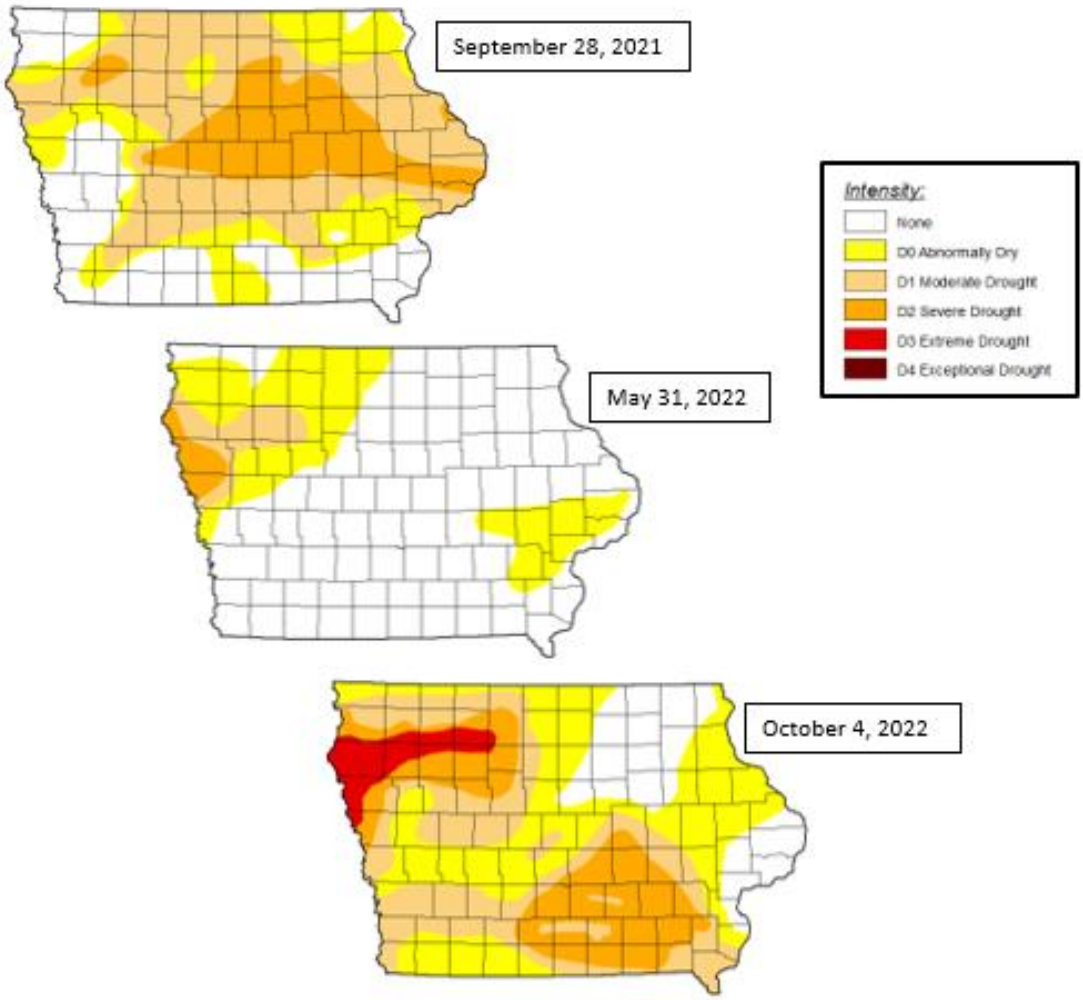


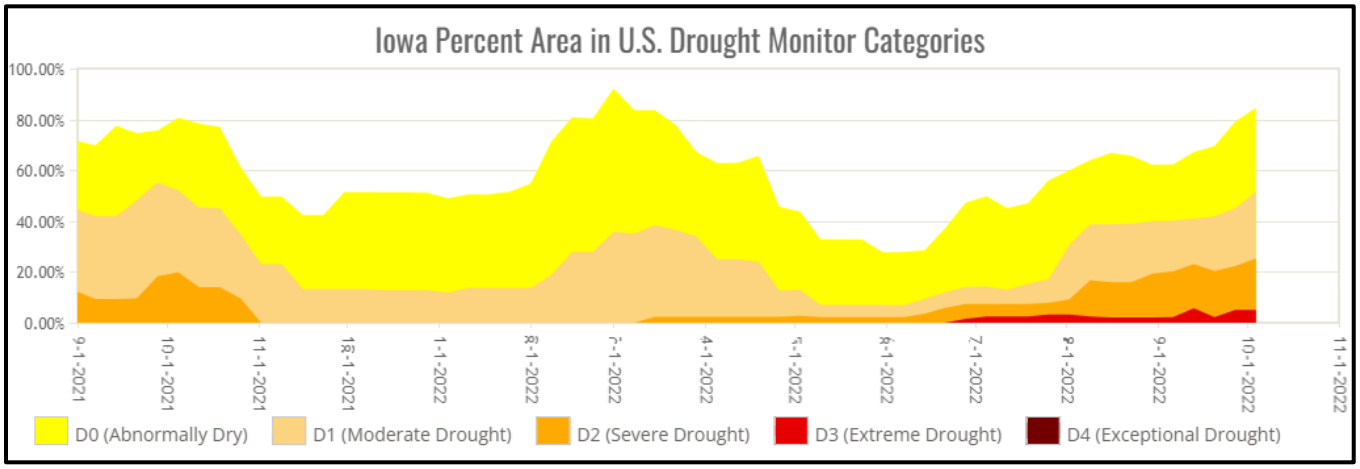
The graph below shows the annual accumulated rainfall of the last three water years. The 2022 Water Year began with a very wet October, but since then the accumulated rainfall has steadily decreased (in comparison with normal) such that the 2022 water year ended 3.96 inches below normal on a statewide average. 2018 and 2019 were very wet years, but since then Iowa has had three dry water years in a row. The total precipitation deficit over these three water years is almost 19 inches, or about 18 percent of the expected precipitation.



DROUGHT MONITOR

The National Drought Monitor (NDM) provides a simplified way to look at regional and statewide trends in drought conditions. Over the course of the 2022 Water Year drought conditions improved but then deteriorated – so that overall drought conditions at the end of the water year were about the same as the start of the water year. Drought conditions were prevalent across much of the state at the start of the water year, are were especially troubling in central and east central Iowa. As the state moved through winter and spring, however, drought conditions improved. The best conditions of the water year were reflected in the May 31, 2022 drought map. From that point, drought conditions worsened, and by the end of the water year, September 30, 2022, conditions were at their worst for the year. The most recent drought map, dated October 4, 2022, shows drought conditions covering much of the state, with significant drought in northwest and southeast Iowa. The graph shows drought coverage remaining steady over the winter months, then worsening in the spring, but improving by early summer. Unfortunately, the improvement did not continue, and drought conditions became steadily worse as the state moved from late summer into fall. By the end of the water year only 15 percent of the state was free from drought, with over a quarter of Iowa rated as moderate or severe drought.

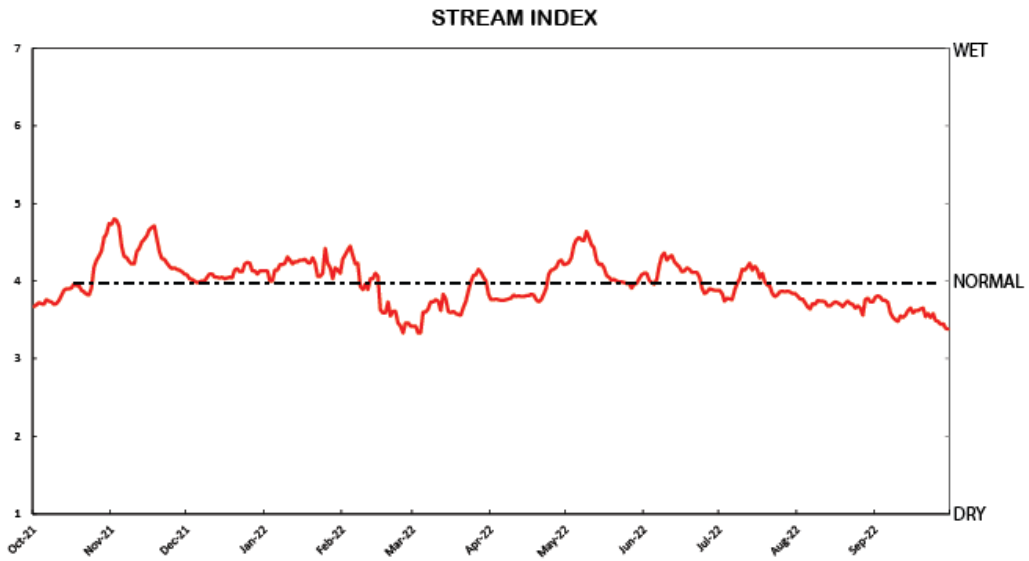




STREAMFLOW

The U.S. Geological Survey (USGS) streamflow index is an average of streamflows at all USGS stream gauges across the state compared to the average streamflow at all those points at that time. This index provides a simplified way of looking at streamflows throughout the year. It does, however, smooth out any abnormally high or low flows that may exist in a small number of watersheds in the state. It is also important to note that average streamflow is typically much lower in the winter than in the spring and early summer.

The 2022 Water Year began with streamflow that was just above normal, and continued in that conditions until late winter, when average streamflow dropped below normal. Over the spring and summer months average streamflow was generally normal to above normal, but in the late summer flows began to drop. The end of the water year shows below-average streamflow across Iowa. It is worth noting that for much of the water year streamflow in northeast Iowa has been above normal, while flow in northwest Iowa has been very low in some locations. The central parts of the state have seen generally normal streamflow for much of the year. Unfortuntely, the trend at the end of the 2022 water year is downward as we enter the time of year when streamflow tends to be at its lowest levels.



SHALLOW GROUNDWATER AND SOIL MOISTURE

The year began with shallow aquifer conditions under slight drought stress in central and north-central Iowa, but otherwise normal conditions were observed across the rest of the state. In early-spring the shallow aquifers of two areas began to chronically exhibit some degree of aquifer stress, including in northwest Iowa around the Big Sioux and Rock Rivers, Floyd River, Ocheyedan and Upper Little Sioux Rivers, Lower Little Sioux and Maple Rivers, Lower Des Moines and Raccoon Rivers, and in east-central to southeast Iowa around the Lower Iowa and Cedar Rivers. By late-summer, the aquifer stress had extended into the southwest and northern parts of the state and by the end of the Water Year 2022 conditions were categorized as below normal, moderate, or severe drought across the western two-thirds of the state. As Water Year 2022 ended the growing dry area resulted in increased water stress and vulnerability to declining shallow groundwater levels.

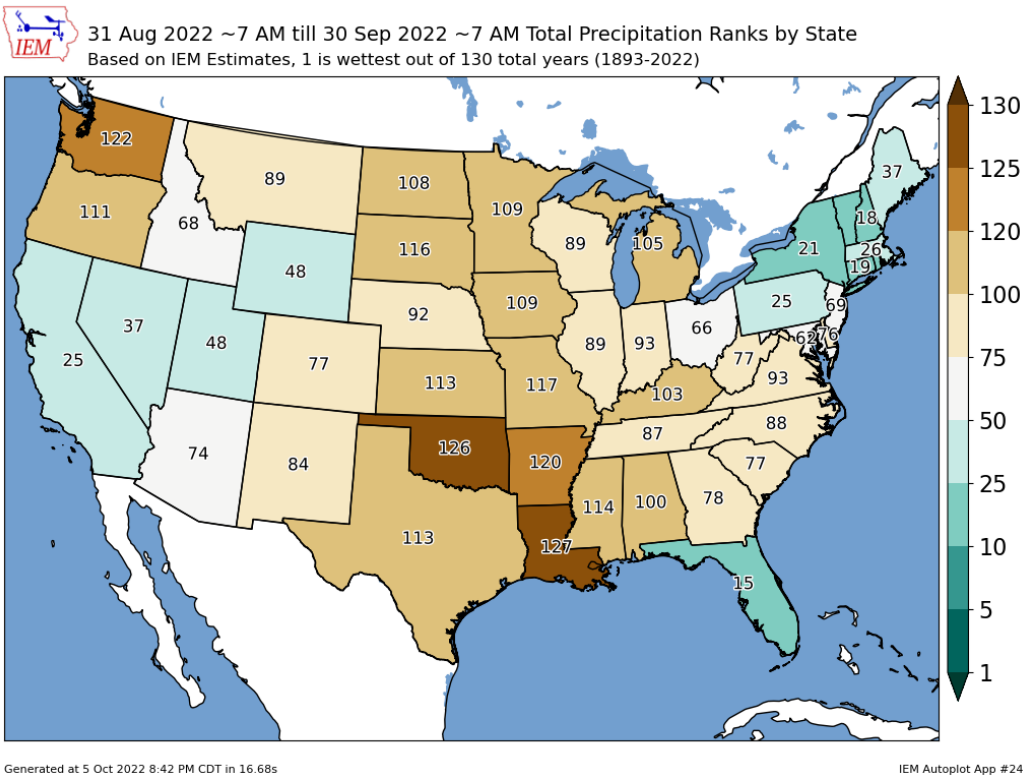
Soil moisture observations obtained from Iowa Flood Center hydrostations and Iowa Mesonet stations were used to create interpolated maps of wetness at the 20-inch depth, for the last day of each month. In general, low soil moisture conditions persisted throughout most of the water year in the northwestern part of the state. Statewide soil moisture values peaked at around 60 percent in May, but by the summer months of July and August, the soil moisture values had dropped to around 25 percent. Wetter areas correspond to the northeastern part of the state at the Upper Iowa River basin, with soil wetness ranging between 60 percent in May and 95 percent in August and September. The rest of the state reported wetness values were in the normal range during most of the year, within 30 percent and 70 percent.

A snapshot of water resource trends for September 2022

PRECIPITATION AND TEMPERATURE – SEPTEMBER 2022

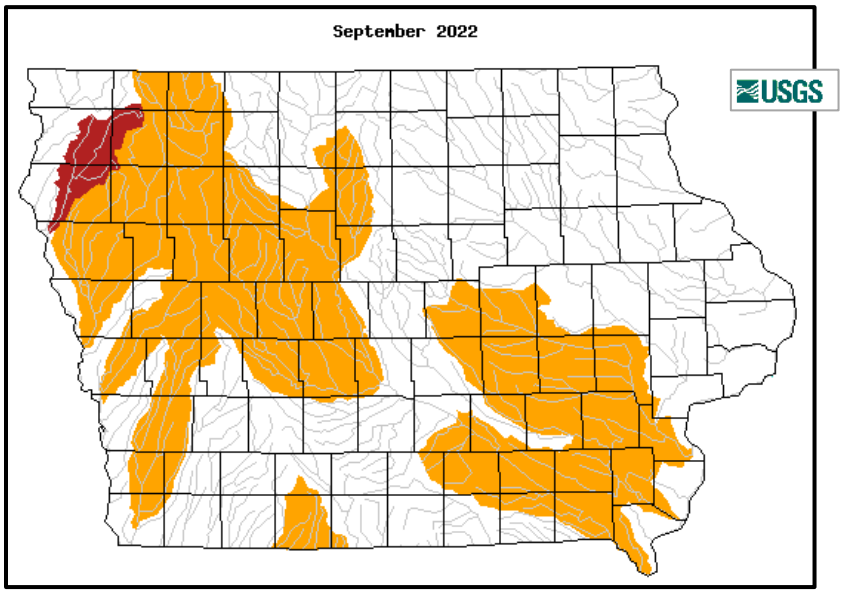
Iowa's preliminary statewide average precipitation totaled 1.80 inches, or 1.68 inches below normal. A drier September last occurred in 2012. The driest conditions in September were found across portions of northwestern and northeastern Iowa, where precipitation departures approached three inches. Only southeastern Iowa observed wetter than normal conditions. Monthly precipitation totals ranged from 0.22 inch at Sheldon to 6.79 inches near Lucas. Across the Midwest region September precipitation was generally in the top twenty driest Spetembers, as shown on the following map.

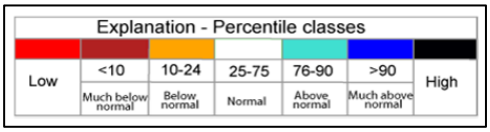
The preliminary statewide average temperature was 65.0 degrees, 1.3 degrees warmer than normal with a warmer September occurring last year. Little Sioux observed the month's high temperature of 102 degrees on the 20th, 26 degrees above normal. Vinton reported the month's low temperature of 26 degrees on the 28th, on average 19 degrees below normal.



STREAM FLOW – SEPTEMBER 2022

During the month of September, streamflow conditions remained below-normal for two-thirds of the state, while the northeast corner of the state went from above-normal flows in August to normal flows in September. The Floyd River remains in much below condition. Portions of the Skunk, Lower Des Moines, Raccoon, Nishnabotna, Lower Iowa, and Boone Rivers have moved into below-normal condition or remained below normal since the last water summary.

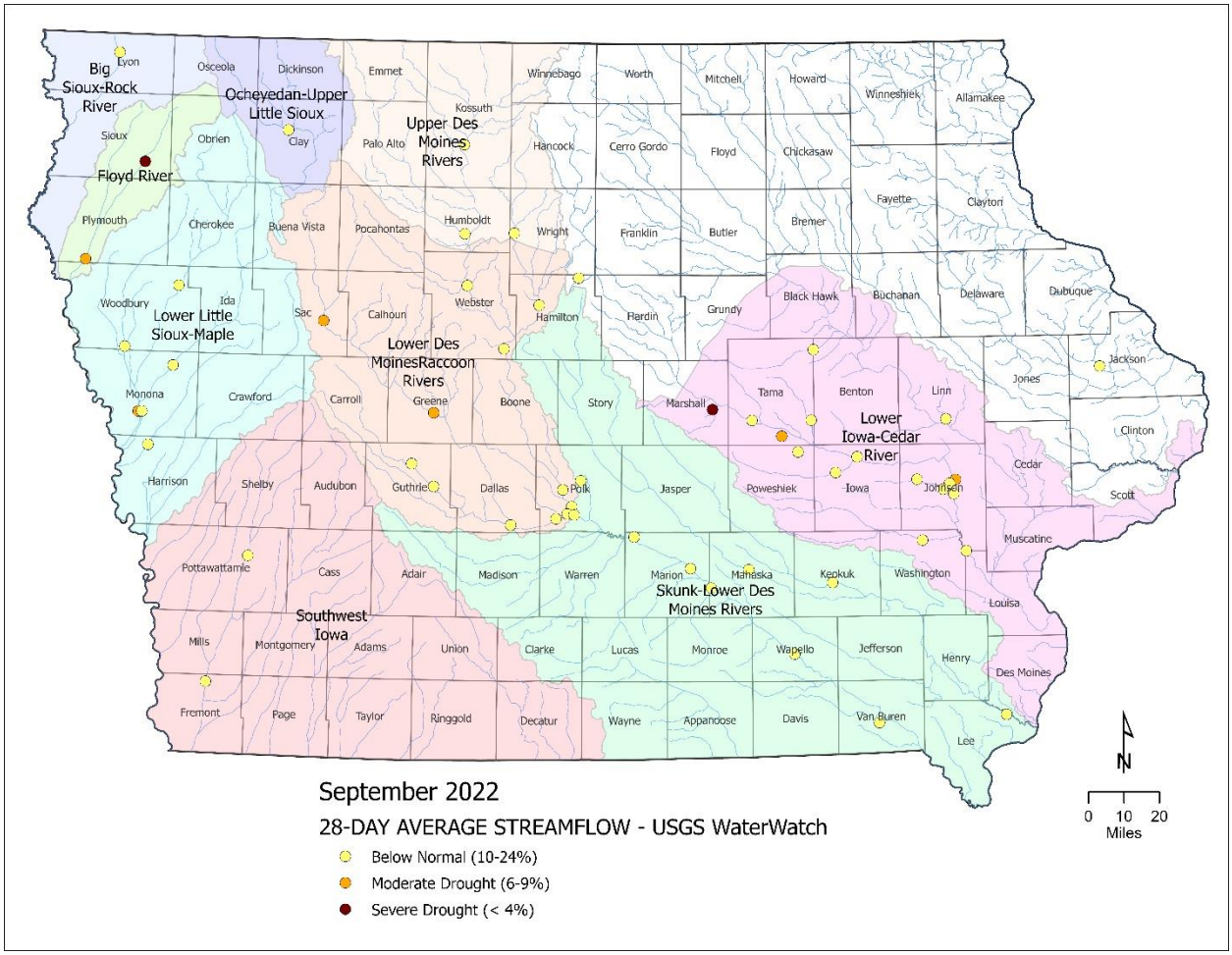




SHALLOW GROUNDWATER - SEPTEMBER 2022

Iowa DNR and Iowa Geological Survey – IIHR Hydroscience and Engineering

September shallow groundwater level conditions are generally below normal across most of the western two-thirds of the state. The northeast part of the state continues to see mostly normal aquifer conditions. The expansion of water stress into southwest and northern Iowa is new since August. The growing dry area indicates increased water stress resulting in greater vulnerability to declining shallow groundwater levels. This is subjectively verified by well and pump contractors in northwest Iowa who reported they are unable to meet demand for drilling new wells and dropping pumps deeper in existing wells. In lieu of a direct shallow groundwater monitoring network the USGS's 28-day average stream baseflow statistical trends are used as an indicator of longer-term water level changes in shallow aquifers.



ADDITIONAL INFORMATION

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